

CLAIMS

What is claimed is:

1. A method for maintaining the reservation state in a network router,
5 comprising maintaining a bounded aggregate per-destination reservation state instead
of a per-flow reservation state.

2. A method as recited in claim 1:
wherein said router maintains rates of incoming and outgoing traffic; and
10 wherein said router does not maintain information on rates of flow.

3. A method as recited in claim 1, further comprising maintaining a set of
token-buckets arranged in the form of a tree for aggregating network flows into classes.
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4. A method as recited in claim 1, further comprising aggregating network
flows utilizing burst-drain-time or burst-ratio.

5. A method as recited in claim 1, further comprising merging a set of data
flows into a smaller set of aggregated flows.
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6. A method as recited in claim 5, wherein said data flows are merged based
on class or destination.

7. A method as recited in claim 1, wherein said router maintain state only for aggregated flows and processes only aggregated flows.

8. A method as recited in claim 7, further comprising:

5 providing guarantees to aggregated flows; and

providing guarantees to individual flows within the aggregated flows.

9. A method as recited in claim 1, further comprising using diffusing computations to maintain consistency of the reservation.

10. A method as recited in claim 1, wherein said aggregate state has a size and associated refresh mechanism.

11. A method as recited in claim 10, wherein aggregate state size and refresh mechanism complexity are a function of a network parameter rather than a function of 15 the number of end-user flows.

12. A method as recited in claim 11, wherein said network parameter comprises class.

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13. A method as recited in claim 11, wherein said network parameter comprises destination.

14. A method as recited in claim 1, wherein said step of maintaining aggregate per-destination reservation state instead of a per-flow reservation state comprises storing and refreshing resource reservations on a per-destination basis rather than on a per-flow basis.

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15. A method as recited in claim 1, further comprising utilizing per-destination refresh messages instead of per-flow refresh messages.

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16. A method as recited in claim 15, wherein a refresh message specifies a destination and bandwidth for that destination.

17. A method as recited in claim 16, wherein when a flow terminates, the source stops sending refresh messages and bandwidth reserved for the flow is released.

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18. A method as recited in claim 1:
wherein the source of a flow sends a refresh message to said router; and
wherein all refresh messages of a particular destination are aggregated at said router.

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19. A method as recited in claim 18, wherein a refresh message specifies a destination and bandwidth for that destination.

20. A method as recited in claim 19, wherein when a flow terminates, the source stops sending refresh messages and bandwidth reserved for the flow is released.

5 21. A method for maintaining the reservation state in a network router, comprising storing and refreshing resource reservations on a per-destination basis, rather than on a per-flow basis.

10 22. A method as recited in claim 21:

wherein said router maintains rates of incoming and outgoing traffic; and
wherein said router does not maintain information on rates of flow.

15 23. A method as recited in claim 21, further comprising maintaining a set of token-buckets arranged in the form of a tree for aggregating network flows into classes.

24. A method as recited in claim 21, further comprising aggregating network flows utilizing burst-drain-time or burst-ratio.

25. A method as recited in claim 21, further comprising merging a set of data flows into a smaller set of aggregated flows.

26. A method as recited in claim 25, wherein said data flows are merged based on class or destination.

27. A method as recited in claim 21, wherein said router maintain state only
5 for aggregated flows and processes only aggregated flows.

28. A method as recited in claim 27, further comprising:
providing guarantees to aggregated flows; and
providing guarantees to individual flows within the aggregated flows.

10 29. A method as recited in claim 21, further comprising using diffusing computations to maintain consistency of the reservation.

15 30. A method as recited in claim 21, wherein said aggregate state has a size and associated refresh mechanism.

31. A method as recited in claim 30, wherein aggregate state size and refresh mechanism complexity are a function of a network parameter rather than a function of the number of end-user flows.

20 32. A method as recited in claim 31, wherein said network parameter comprises class.

33. A method as recited in claim 31, wherein said network parameter comprises destination.

34. A method as recited in claim 21, further comprising utilizing per-
5 destination refresh messages instead of per-flow refresh messages.

35. A method as recited in claim 34, wherein a refresh message specifies a destination and bandwidth for that destination.

10 36. A method as recited in claim 35, wherein when a flow terminates, the source stops sending refresh messages and bandwidth reserved for the flow is released.

15 37. A method as recited in claim 21:
wherein the source of a flow sends a refresh message to said router; and
wherein all refresh messages of a particular destination are aggregated at said router.

20 38. A method as recited in claim 37, wherein a refresh message specifies a destination and bandwidth for that destination.

39. A method as recited in claim 38, wherein when a flow terminates, the source stops sending refresh messages and bandwidth reserved for the flow is released.

5 40. A method for maintaining the reservation state in a network router, comprising:

merging a set of data flows into a smaller set of aggregated flows; and

storing and refreshing resource reservations on a per-destination basis, rather than on a per-flow basis;

10 wherein said router maintains rates of incoming and outgoing traffic; and

wherein said router does not maintain information on rates of flow.

15 41. A method as recited in claim 40, further comprising maintaining a set of

token-buckets arranged in the form of a tree for aggregating network flows into classes.

42. A method as recited in claim 40, further comprising aggregating network

flows utilizing burst-drain-time or burst-ratio.

18 43. A method as recited in claim 40, wherein said data flows are merged

20 based on class or destination.

44. A method as recited in claim 40, wherein said router maintains state only for aggregated flows and processes only aggregated flows.

45. A method as recited in claim 44, further comprising:

5 providing guarantees to aggregated flows; and

providing guarantees to individual flows within the aggregated flows.

46. A method as recited in claim 40, further comprising using diffusing computations to maintain consistency of the reservation.

10 47. A method as recited in claim 40, wherein said aggregate state has a size and associated refresh mechanism.

15 48. A method as recited in claim 47, wherein aggregate state size and refresh mechanism complexity are a function of a network parameter rather than a function of the number of end-user flows.

20 49. A method as recited in claim 48, wherein said network parameter comprises class.

50. A method as recited in claim 48, wherein said network parameter comprises destination.

51. A method as recited in claim 40, further comprising utilizing per-destination refresh messages instead of per-flow refresh messages.

52. A method as recited in claim 51, wherein a refresh message specifies a destination and bandwidth for that destination.

53. A method as recited in claim 52, wherein when a flow terminates, the source stops sending refresh messages and bandwidth reserved for the flow is released.

10 54. A method as recited in claim 40:

wherein the source of a flow sends a refresh message to said router; and

15 wherein all refresh messages of a particular destination are aggregated at said router.

55. A method as recited in claim 54, wherein a refresh message specifies a destination and bandwidth for that destination.

20 56. A method as recited in claim 55, wherein when a flow terminates, the

source stops sending refresh messages and bandwidth reserved for the flow is released.